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Abstract

The composition of lenders has changed dramatically since the crisis, and non–bank lenders have become important players in the commercial mortgage–backed securities (CMBS) markets. Comparing banks to non–bank lenders, we investigate whether the geographical distance between lenders, borrowers and their properties is reflected in the pricing of US mortgages that were included in US CMBS pools during the 2000 to 2017 period. We find that a doubling in bank–borrower distance is associated with a 2.5 basis point increase in the spread, and that this effect is more pronounced if the loan is collateralized by a riskier property. Geographical distance does not seem to have any effect on the loan spread for mortgages granted by non–bank lenders. The difference in loan pricing across originator types (even after controlling for key mortgage and property characteristics) suggests banks and non–bank lenders have different incentives, lending technologies, and/or different types of borrowers.

Keywords: CMBS, non–bank lending, geographical distance, asymmetric information, loan spread.
JEL Codes: G21, G32.

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1. Introduction

A long line of work on financial intermediation provides evidence that geography matters for lending. Geographical distance weakens not only pricing power but also lenders' ability to acquire information. These effects are found to be present in different settings such as M&A (Ragozzino and Reuer (2011)), venture capital (Tian (2011)), small business lending (Petersen and Rajan (2002), Agarwal and Hauswald (2010), Bellucci et al. (2013)), and syndicated lending (Knyazeva and Knyazeva (2012)). However, the finance literature has largely ignored the effect of geographical distance in the commercial mortgage backed securities (CMBS) market.

Moreover, the CMBS market provides a good setting in which to analyze the effect of geographical distance on loan originations, given the heterogeneity of loan underwriters comprising banks as well as non–bank lenders such as finance companies, pension funds and insurance companies. The composition of lenders has changed dramatically in the CMBS market. For example, major banks like Bank of America, Citigroup, JP Morgan, Morgan Stanley and Goldman Sachs collectively represented more than 90 percent of the CMBS loan origination business in 2012, but their share dropped to roughly 65 percent by the end of 2015.[1] Our dataset also reflects the fact that while banks were the dominant lenders in the CMBS market before the crisis, non–bank lenders have increased their share since the crisis. The aggressive growth in lending especially by non-bank lenders could suggest riskier lending by those financial institutions.

Geographical distance is an important phenomenon affecting lenders' ability to collect information. While distance effects have not been specifically investigated for the CMBS markets, the emerging trends in lender composition make it possible to investigate how banks' and non–bank lenders' loan pricing differ from one another in the context of geographical distance. In this paper, we investigate how geographical distance affects the spread on loans that are subsequently packaged into commercial mortgage backed securities (CMBS), also thereby comparing banks and non–bank lenders' loan pricing.

We analyze this phenomenon by using geographical distance as a proxy for reduced access to soft information. As the CMBS market has been given a lot of attention by government

[1] https://www.reuters.com/article/usa-bonds-abs/new-cmbs-risk-rules-threaten-smaller-lenders-access-idUSL8N14Q3HQ20160108

regulators since the 2008 financial crisis, loan pricing in the CMBS market remains a relevant question. The CMBS market has very different characteristics from residential mortgages and much less is known about it. CMBS pools contain fewer loans compared to the large pools of residential mortgage–backed securities due to the size of commercial mortgages (Baghai and Becker (2018)). The standardization in the residential mortgage market, especially the standard scoring system, makes soft information less relevant for lenders. On the other hand, commercial properties are more heterogeneous than residential properties, making soft information more critical for commercial mortgage and CMBS originators (Titman and Tsyplakov (2010)). To answer our research question, we focus on two dimensions of distance in this setting: the distance between originator and borrower, and the distance between borrower and real estate collateral.

Geographical distance is likely to be salient and positively associated with the loan spread in the CMBS market for two main reasons. First, even though screening over distances is costly for loan originators, they continue to screen borrowers and invest in soft information because of reputation concerns. In that sense, reputation is a non-contractual incentive that serves as a mechanism that disciplines lenders to screen and monitor borrowers even for loans that are subsequently securitized (Titman and Tsyplakov (2010)). Thus, the loan spread might be higher due to the screening cost arising from originator–borrower distance if originators set higher loan rates following a simple rule of mark-up over marginal cost, which we refer to as the *marginal cost pricing hypothesis*. Second, if the lender's signal about the borrower's creditworthiness diminishes with originator–borrower distance, the spread might be higher due to the adverse selection risk. We call this the *adverse selection hypothesis*.

On the other hand, most existing studies find a negative distance–spread relation, which is attributed to spatial price discrimination (see, e.g. Petersen and Rajan (2002), Degryse and Ongena (2005), Agarwal and Hauswald (2010)): Local lenders exploit their monopoly power and charge borrowers higher interest rates. In the CMBS market, however, we argue that borrowers are less subject to spatial price discrimination and rent extraction by lenders due to the supra–regional nature of CMBS lending and the degree of competition between lenders, most of whom are headquartered on the coastal region of the US, and located far away from inland real estate borrowers. Thus, in contrast to the existing literature, we expect a positive relation between lender–borrower distance and the loan spread.

We also hypothesize that the effect of originator–borrower distance on the spread should be more pronounced for riskier property type collaterals. If risk is increasing in originator–borrower distance, it should matter most when the loan is collateralized by a risky property type, because it will be repaid from the cash flows generated by those properties. Hotel and industrial property types have the most volatile cash flows, while apartments' cash flows are less risky (Titman et al. (2005)).

Alternatively, we also evaluate the impact of distance between the borrower and the property. For borrowers located farther away from their properties, asymmetric information about local market conditions should be more marked. For example, it might be difficult for those borrowers to distinguish between immediate income and future value of the cash flows generated by the property. To fully assess the quality of a building or its location, one needs to visit it, talk to tenants, and stroll around the area. Since lenders know this, we hypothesize that the loan spread increases with distance between borrower and property.

We use a dataset of loans issued in the US over the period 2000-2017 that are subsequently securitized. The dataset covers 26,303 conduit loans originated by US banks, bank holding companies and non–bank lenders exclusively for direct sale into the secondary market. The dataset includes rich information on the loans and the properties, as well as information about the borrowers and the lenders.

Our results show that a greater bank–borrower distance is associated with higher loan spreads. We find that the spread difference between a typical loan extended by a lender located in the direct vicinity of the borrower and a loan extended by a lender 893 miles away - the median distance in our sample for banks - is 17 basis points. To put this in perspective, the median loan size in the sample is USD 6 million, so this additional spread implies approximately USD 10,000 in additional annual interest costs. We also find that this effect is more pronounced for riskier collateral assets, such as industrial, retail, and office properties. For example, the additional annual interest cost is on average USD 22,000 for industrial properties relative to apartments. Similarly, we analyze and show that the distance effect is less pronounced for large-size loans, as they are more likely to be transparent.

We do not find any effect for non–bank lenders. The difference in loan pricing across originator types even after controlling for key mortgage and property characteristics suggests that banks and non–bank lenders have different incentives, lending technologies, and/or different types of borrowers.

We also perform default analysis. We find that the distance between originator (closest branch for banks) and borrower increases default probability for loans originated by banks and non–bank lenders. This indicates that access to soft information is a predictor of loan performance, but it is only priced in by banks, and not by non–bank lenders. Mainly, our findings can be interpreted as showing that non–bank lenders incorporate soft information less than banks, indicating riskier lending decisions by the former.

This paper contributes in several ways to previous research on information problems in lending markets, and specifically in the CMBS market. The CMBS market is a major source of funding for commercial real estate loans in the US, with an outstanding balance that peaked at USD 871 billion in 2007 and was around USD 495 billion in 2017, according to NAREIT.[2] First, our main contribution is to investigate how different types of lenders, specifically banks and non–bank lenders, price loans in the presence of informational frictions associated with geographical distance. The role of geographical distance in loan transactions has been investigated in different market settings, such as syndicated lending and small business lending. Less well understood, however, is how different types of intermediaries set the price in that case. The CMBS market offers a perfect setting to investigate this question, given the diversity of the loan originators. To the best of our knowledge, our paper is the first to investigate the differences in the impact of geographical distance on loan pricing by comparing banks to non–bank lenders in a single setting, the CMBS market.

Second, our paper builds on the CMBS literature by improving our understanding of lending practices in the CMBS market. We find that the loan spread increases with bank–borrower distance, whereas the geographic distance does not seem to have any effect in the case of the loan spread for non–bank lenders. One strand of the literature examines how securitization affects the willingness of lenders to bear the cost of due diligence activities. Black et al. (2012) investigate differences across originator types in the CMBS market and conclude that loans originated by insurance companies, commercial banks, and finance companies perform better than loans originated by investment banks and foreign entities. Also, their results show that, despite the potential for engaging in adverse selection, balance sheet lenders underwrite higher quality loans. Titman and Tsyplakov (2010) link screening incentives to the reputation hypothesis. They show that when mortgage originators have experienced poor stock performance in the recent past, the credit spreads of CMBS mortgage loans originated by these institutions are larger. The authors argue that their findings are

[2]https://www.reit.com/news/blog/market-commentary/other-side-cmbs-wall-maturities

consistent with the idea that originators relax underwriting standards when they are doing poorly and when they are more concerned about short–run profitability than about their reputation.

The rest of the paper is organized as follows. Section 2 presents the theoretical motivation for our empirical analysis. Section 3 describes the data and the measurement of the variables. Section 4 presents our empirical results, and Section 5 gives the results of additional robustness tests. Section 6 concludes.

2. Theoretical Framework and Hypotheses

2.1. Motivation

Theories of financial intermediation suggest that lenders must be given appropriate incentives for screening and monitoring (Hölmstrom and Tirole (1997)). In the "originate-to-hold" model, this incentive is provided by the performance of the illiquid loans on their balance sheets (Diamond and Rajan (2001), Keys et al. (2010)). However, in the "originate-to-distribute" model, lenders intend to offload credit risk after issuing loans (Purnanandam (2011)). Due to the lack of their own "skin in the game" as a result of securitization, the lenders' incentive to collect private information on loan quality is weakened, possibly to such an extent that the effects of moral hazard and adverse selection become apparent in subsequent loan performance (An et al. (2009, 2011); Black et al. (2012); Rajan et al. (2015)). In fact, this "lack of doing one's homework" due to securitization was exactly what many commentators and policy makers pointed to when seeking to explain the origins of the great financial crisis of 2008.[3]

However, the securitization process of mortgage loans is a repeated game, in which a lender repeatedly originates loans that are then sold to CMBS purchasers (Rajan et al. (2015)). Due to this repeated nature of securitization, lenders have an incentive to build and maintain a good reputation for originating high–quality loans. The originator knows that issuing low–quality loans with a higher likelihood of poor performance will hurt his reputation and may lead to a loss of future economic rents. For example, if defaults are too

[3]See, e.g., Luis A. Aguilar, Speech by SEC Commissioner: Realigning Incentives in the Securitization Market, U.S. Securities and Exchange Commission, March 30, 2011, https://www.sec.gov/news/speech/2011/spch033011laa-item-1.htm

high in a given year, CMBS purchasers can punish a lender by not buying his loans in the future (Titman and Tsyplakov (2010), Rajan et al. (2015)). Thus, the need to build and preserve a good reputation could provide lenders with a non–contractual incentive to collect and screen soft information, and to use it in their loan acceptance and pricing.

Existing research has provided mixed evidence regarding securitization and the incentives for financial intermediaries to appropriately screen and monitor borrowers. Keys et al. (2010) investigate whether the securitization process reduces the incentives of financial intermediaries for careful screening of subprime mortgage loans in the US, and find evidence that it does. Conversely, by investigating both securitized and unsecuritized loans in the Italian prime mortgage market, Albertazzi et al. (2015) find that for given observable characteristics, securitized mortgages have a lower default probability than non-securitized mortgages. They show that the underlying mechanism is originator reputation; banks do seem to care about their reputation for not selling lemons.

However, these studies are limited to the residential mortgage market, with a focus on the subprime market, which is a very specific segment of the credit market. Much less is known about the CMBS market, which has very different characteristics to the market for residential mortgages. For example, unlike residential mortgage–backed security asset pools, which contain many residential mortgages, CMBS asset pools usually consist of relatively few loans, due to the large size of commercial mortgages (Baghai and Becker (2018)). Therefore, CMBS have more concentrated real estate risk, and understanding the quality of each of the underlying loans and their real estate collateral becomes more important, especially since commercial property is much more heterogeneous than residential property. Moreover, CMBS loans have prepayment protection, making default risk more important.

Furthermore, for residential mortgages, loan originators tend to use standardized scoring systems that ignore soft information. However, soft information such as reliability of the owners and alternative uses of property plays an important role for commercial mortgage origination (Titman and Tsyplakov (2010)). Since gathering soft information is likely to be costly, geographic distance becomes more important in the CMBS market.

Another important phenomenon in the CMBS market is the emerging trend in the composition of lender types. Using our sample, Figure 1 reflects the trend in the composition of commercial mortgage lending by banks and non–bank financial institutions. While before the crisis, banks dominate CMBS lending, the trend reverses during the post–crisis period.

Lending grows overall, but non–banks possibly engage in more aggressive lending.[4] These trends make the research questions we address in this paper more important as little is known about them. For instance, we expect that this aggressive lending can potentially indicate riskier lending by non–bank lenders relative to banks, along with the likelihood of soft information being ignored.

[Figure 1 here]

2.2. Hypotheses Development

Economic theory suggests two factors in the role of geographical distance in loan transactions: *information costs* and *transportation costs*. First, geographical distance affects information costs incurred by both borrowers and lenders. Borrowers may incur search costs associated with information acquisition about loan products and conditions offered by alternative lenders. Lenders may face information costs that vary with distance, as the quality of the signal that the lender receives decreases with the distance. In traditional lending (originate-to-hold), lenders are not willing to supply credit to distant borrowers who have been rejected by lenders with superior information, because of the "winner's curse" threat (Alessandrini et al. (2009)). However, when uninformed lenders do provide loans to distant borrowers, they may charge higher risk premia due to the risk of granting loans to an adversely selected pool of applicants rejected by potentially better informed lenders.

One could also argue that if the borrowers or their real estate collateral are not nearby, lenders most likely rely on real estate agents' local market research (i.e. professional brokers) to ameliorate information asymmetry problems. In that case, the spread might be lower given that the information asymmetry is thereby reduced. However, maintaining a relationship with real estate agents likely imposes a cost on the lenders (Alessandrini et al. (2009)). Therefore, even if real estate agents are engaged in the loan underwriting process, the spread might still be higher due to the cost arising from distance.

Second, borrowers and lenders may incur transportation cost. If borrowers face higher transportation cost when visiting competing lenders, local lenders may engage in spatial price

[4]CMBS issuance declined in 2016 due to many factors such as market uncertainty and implementation of new regulations. The Dodd-Frank Act requires issuers of all types of asset-backed securities to retain at least a 5 percent share of any security they issue, as determined by its fair value.The risk retention rule that is part of this act was implemented in December 24, 2016.

discrimination. Accordingly, local lenders accumulate market power and extract rents from nearby borrowers. Evidence of such spatial price discrimination is found in small business lending (Degryse and Ongena (2005), Agarwal and Hauswald (2010)), which shows a negative relation between bank–borrower distance and interest rates. In the CMBS market, however, it is likely that borrowers are less subject to price discrimination by banks as they are not solely reliant on bank loans. Borrowers are able to raise financing from non–bank lenders, and banks do not know where their competitors are, given the wide geographic distribution of these lenders.

Banks may also incur transportation costs when screening borrowers. The screening process includes the evaluation of the financial performance of the borrower, and the effort by the bank management to obtain soft information on the borrower and the loan collateral (Gehrig (1998)). Any travel costs incurred by the bank make loan originations to distant borrowers costlier (Alessandrini et al. (2009)). The cost a bank must incur to screen and monitor such a borrower is relative to the distance between the bank and the borrower (Sussman and Zeira (1995), Almazan (2002)). Given that screening costs increase with bank–borrower distance, banks might incorporate this cost in loan terms by setting higher loan rates following a simple rule of mark–up over marginal cost (Bellucci et al. (2013)). In that case, the loan spread should be positively associated with bank–borrower distance. Indeed, Knyazeva and Knyazeva (2012) find a positive relation between distance and the loan spread for large borrowers in the syndicated loan market, which they attribute to the costly delegated monitoring process for lenders.

One may wonder why originators are even willing to extend loans to far–away borrowers. This may have to do with the high competition in the CMBS market, driving conduit lenders to expand their radius. In this market, banks are competing with each other, but increasingly also with non–bank lenders operating in the regulatory shadows.

Given that the information cost effect and the transportation cost effect on loan spreads point in the same direction, and that spatial price discrimination is less likely in the CMBS market, we expect that loan spread increases with distance between lender and borrower. We additionally expect this relationship to be more pronounced for banks compared to non–bank lenders.

Hypothesis 1: *The loan spread increases with distance between lender and borrower.*

Next, we consider how the loan spread varies with the property type. Commercial mortgage default varies systematically with property type (Vandell et al. (1993), Ciochetti et al. (2002), An et al. (2011)). Apartments are characterized by lower levels of uncertainty and less sensitivity to the business cycle than retail and office (An et al. (2011)), so multi–family loans are the least risky. If risk is increasing with originator–borrower distance, this should matter most when the loan is also collateralized by a risky property type, because the loans will be repaid from cash flows generated by those properties. Therefore, we argue that the effect of geographical distance on the loan spread should be more pronounced if loans are collateralized by a risky property type such as hotel or industrial property. We also expect that banks might pay more attention to the riskiness of the collateral asset compared to non–bank lenders.

Hypothesis 2: *The increase in loan spread is more pronounced for riskier property types.*

Garmaise and Moskowitz (2004) argue that information considerations are important in real estate markets for two reasons. First, the real estate market is illiquid, so conveying information to market participants is a slow process. Second, real estate assets are idiosyncratic and difficult for non–locals to value. Garmaise and Moskowitz (2004) employ the distance between borrower and property as an indirect proxy for asymmetric information. By testing the implications of the "no trade" theorem of Milgrom and Stokey (1982), they find that market participants resolve information asymmetries by purchasing nearby properties. For borrowers located closer to the properties, asymmetric information about local market conditions is less severe, so the lender receives a more precise signal about those borrowers' understanding of local market conditions. The distance between borrower and property is highly relevant in the CMBS market, since this market allows CMBS investors to invest easily in a variety of geographic locations for diversification reasons. Therefore, we expect that lenders predicate their loan pricing on borrowers' access to soft information regarding local market conditions, which would imply a positive relationship between loan spread and borrower–property distance. Similarly, we expect this relationship to be more prominent for banks compared to non–bank lenders.

Hypothesis 3: *The loan spread increases with distance between borrower and property.*

We now turn to our dataset to test these hypotheses.

3. Data and Variables

3.1. Sample Construction

We use a dataset of commercial mortgages provided by Real Capital Analytics Inc. (RCA), a leading data provider in commercial real estate. Our primary sample of CMBS conduit loans includes 55,892 commercial mortgages that were originated between January 2000 and August 2017. The loan originators in the larger dataset are heterogeneous in terms of their financial activities. The categories include banks, corporate, developer/owner/operator, equity fund, finance, government, insurance, investment manager, pension fund, REIT, REOC, and religious institutions. The largest category in the dataset is "Bank". We classify all other types of originators as "Non–bank."

We exclude syndicated loans and focus exclusively on sole–lender loans. Similarly, we exclude loans to multiple borrowers. Following the loan pricing literature, we drop the loans to Real Estate Investment Trusts and banks from the sample. Finally, we exclude non–US lenders as well as borrowers located outside the US. The final sample includes 26,303 loans for 24,885 unique real estate properties to 8,538 unique borrowers.

The market for commercial property conduit loans is quite concentrated. Wells Fargo, Citigroup, JP Morgan, Ladder Capital, Morgan Stanley, Berkadia, Bank of America and Goldman Sachs are among the top ten originators, and together comprise 46.9 percent of our sample.

Table A.1 shows the sample distribution by property type. The apartment is the most common type of collateral property. 36.27 percent of the collaterals for the loans originated by the banks are apartments, while 54.07 percent of the collaterals for non–bank loans are apartments. Overall, this implies that the non–bank lenders' collateral portfolio has lower levels of uncertainty and less sensitivity to the business cycle.

3.2. Variables

Our sample provides information on the loans, the collateralizing properties, the lenders and the borrowers. We will use this subsection to present and discuss all variables. We begin with the distance variable, which is our key explanatory variable. Appendix B provides information regarding the definition of all variables used in the study.

3.2.1. Measurement of Distance

We calculate distances using geographic coordinates. RCA data contains latitudes and longitudes for borrower, property and headquarter of the lender. CMBS loans are typically so large and complex in comparison to other mortgages that on the depositor side, Regulation AB II requires a certification by the chief executive officer (CEO) of the depositor stating that the securitization as described in the prospectus is designed to produce cash flows from the assets in amounts sufficient to service expected payments on the securities. Hence, the senior management team of a lender is likely to be involved in the loan approval decision, term setting, and loan pricing. We therefore focus on the locations of lenders' headquarters.[5] We do also consider the possibility of local branch involvement in the loan application process, and assess the effect of branch location, in the robustness section.

Because of the skewness and the possible nonlinearity of the economic impact of distance, we employ a logarithmic transformation of distance. $Ln(1 + Distance_{Originator-Borrower})$ is defined as the natural logarithm of one plus distance (in miles) between the originator headquarter and the borrower. Similarly, we define $Ln(1 + Distance_{Originator-Property})$ and $Ln(1 + Distance_{Borrower-Property})$.

[Figure 2 here]

Figure 2 shows a map of the US depicting the headquarter locations of the originators. New York accounts for twenty–five observations, including the headquarters of Citigroup, JP Morgan, Ladder Capital and Morgan Stanley which are among the top ten originators in our sample. Another relevant concentration is in California with twelve observations, including

[5] Unlike in studies on small business lending, top management involvement in the lending decisions is also argued in the syndicated loan market (see, e.g. Knyazeva and Knyazeva (2012); Hollander and Verriest (2016)).

Wells Fargo. First National Bank Alaska is headquartered in Alaska, which is not shown on the map.

[Figure 3 here]

Figure 3 shows the distribution of the 8,510 borrowers of our sample across the US. Although we observe clusters of borrowers in the major urban areas in the West and the North East, we also have a sizeable number of borrower observations in other regions. Of all loans in the sample, 21.33 percent are to borrowers in California, mostly clustered in the major urban centers like the San Francisco Bay area and Los Angeles. New York and Florida are the other two states with major borrower clusters, with 11.21 percent and 5.57 percent of our sample located in these states, respectively.

[Figure 4 here]

Figure 4 shows the distribution of locations for the 24,812 properties in the sample. The map shows that the main US urban areas are all represented in the sample, with California, Texas and Florida the most important locations: 31.50 percent of the loans are collateralized by properties located in these states.

3.2.2. Mortgage Loan Characteristics

Our dependent variable *Spread* is mortgage spread. We define mortgage spread as the difference between the mortgage rate and the Treasury bond rate with the same maturity, at the mortgage origination date. We restrict our sample to fixed-rate mortgages. Figure 5 shows the average loan spread over time, plus and minus one standard deviation. For each year, the dot depicts the mean spread, and the bar shows the plus and minus one standard deviation range. The blue line shows the average spread, 225 bps, for the whole sample period. We see that there is a sharp increase in average spread during the 2008 financial crisis, and that the standard deviation of loan spreads is very large in 2009. Although spreads have come back down after the crisis, they are not as low as they were between 2003 and 2007, and seem to be hovering around their average level for the sample period.

[Figure 5: Spread by Years]

Standard risk considerations of commercial loan underwriting involve the loan–to–value ratio (LTV). The LTV ratio of a loan is measured as the loan amount divided by the appraised value of the real estate collateral. Previous studies find that LTV is correlated with loan performance (Archer et al. (2002); Ambrose and Sanders (2003)), and that LTV is an important predictor of default risk (An et al. (2011)). We therefore expect LTV to be positively related to mortgage spreads.

Along with LTV, the debt service coverage ratio (DSCR) is another important predictor of default risk. DSCR measures the ability of a commercial property to cover debt service payments from the rental revenue. After the 2008 financial crisis, financial institutions were heavily criticized for the relaxation of pre–crisis underwriting standards, for example by basing the DSCR on estimates of future rents, rather than on actual or historical rental income (Black et al. (2012)). We anticipate that DSCR is negatively correlated with the spread.

We also control for observable loan characteristics such as loan size and loan maturity. We expect that loan size is negatively related to spread due to economies of scale in lending. That is, the costs of making loans to small borrowers tend to be relatively greater than the costs of making loans to large borrowers. We similarly control for loan maturity and expect that this negatively affects spreads on CMBS loans. Commercial mortgages with a longer maturity have a lower default risk than those with a shorter maturity (An (2007)).

3.2.3. Property Characteristics

Our data on the collateral properties is quite rich. We have six property types in the dataset: rental apartment, hotel, industrial, office, retail, and other. We construct six indicator variables for these property types and use "apartment" as the base case in the regressions. The most common property type is apartment, with 42.46 percent of the loans collateralized by apartment assets. Apartments are characterized by lower levels of uncertainty and less sensitivity to the business cycle than retail and office (An et al. (2011)), whereas properties with volatile and cyclical cash flows such as industrial and hotels are viewed as the riskiest forms of commercial property collateral. We therefore expect loans to finance apartments to have lower spreads, followed by office, retail and hotel with industrial property loans having the higher spreads.

Titman et al. (2005) find that newer properties have lower spreads. This is likely because property age is a proxy for quality. Older properties are likely to be of lower quality, with a lower structure value relative to land value, increasing the moneyness of the redevelopment option, and therefore increasing the likelihood of redevelopment. This flexibility is likely to increase the spread (Titman et al. (2005)). Moreover, the age of a property is also a proxy for the degree of information asymmetry (Garmaise and Moskowitz (2004)). Properties with longer cash flow histories provide investors with more information about the property and local market conditions. We have the age of the properties at the mortgage origination date. Since it is likely that the age of the property does not affect the spread linearly, we use indicator variables for different age categories: less than 10 years old, between 10 and 20, between 20 and 30, between 30 and 40, between 40 and 50 and more than 50 years old. This argument about higher spreads for mortgages on properties with more investment flexibility also applies to properties that can be renovated. We therefore include an indicator variable that equals one if the property has been renovated.

We also control for height of the properties. The number of stories can be associated with spread for a variety of reasons. First, properties with a large number of stories generate additional rental income. For example, in some cities such as New York City, where land costs are high and plot sizes are small, building height is more important for total rentable space than the horizontal area (Barr (2010)). Second, there may be economies of scale associated with lower transaction costs in making loans to larger properties. For 65 percent of our sample, the number of stories is equal to one. Therefore, we define an indicator variable, *Number of Stories>1*, for the properties which have more than one story.

Another important factor in real estate quality and risk is the location. Assets located in or near a city's central business district tend to have less vacancy risk in down markets. This implies that their rental cash flows are less dependent on the business cycle. We therefore define an indicator variable for whether the property is located in the central business district (CBD). We expect the spread to be lower for loans involving properties located in CBDs.

3.2.4. Other Control Variables

In addition to these mortgage and property–specific variables, we also include a set of other variables that are known to affect loan spreads. Specifically, we include quarterly time–fixed effects to control for interest rate conditions that vary from quarter to quarter. We also include indicator variables for stated loan purposes: property acquisition or refinance. Following the literature (Ciochetti et al. (2002); Ambrose and Sanders (2003); Titman and Tsyplakov (2010); An et al. (2011)), we also introduce fixed effects for the state where the property is located, as commercial mortgage default varies with geographic location. As a proxy for the level of competition in a state, we include the log of the Herfindahl-Hirschman Index (HHI) of originator concentration in the state in which the borrower is located. We construct the HHI based on the market share by loan amount of each originator in a given state and year. A higher HHI means that concentration is high, possibly reducing spreads.

Existing research, for example An et al. (2011), argues that investors pay a substantial premium for CMBS loans originated by lenders who have a strong reputation for strict underwriting in the commercial mortgage market. In order to take lender reputation into account, we include lender–fixed effects in all models.

3.3. Summary Statistics

Table 1 provides summary statistics of the key variables. The spread has a mean value of 224 basis points and a median value of 225 basis points. The spread on non–bank loans is on average significantly higher than the spread on bank loans.

[Table 1: Summary Statistics]

Average originator–borrower distance is 1,131 miles, and lenders are located, on average, 1,083 miles away from the property collateral. The shortest distance is the one between borrower and property and it is, on average, 537 miles. The distance series are skewed; the median originator–borrower distance is 928 miles, the median originator–property distance is 926 miles, and the median borrower–property distance is 209 miles.

In Figure 6 and Figure 7, we present mean and median distances between loan originator, borrower and property. The correlation between, $Distance_{Originator-Borrower}$ and $Distance_{Originator-Property}$ is quite high (0.64). For three hundred and fifty–two observations, the minimum value of $Distance_{Borrower-Property}$ is 0. In most cases, these properties are apartments and offices.

[Figure 6 and 7]

The average LTV is 65 percent, with apartments having the highest LTV ratios at an average of 67 percent, and hotels the lowest, at an average of 61 percent. This pattern supports the view that LTV ratios are endogenously chosen to allow for the riskiness of the property type (Titman et al. (2005)). The average DSCR is 1.74. The average maturity for loans is 118 months. The average loan size is USD 11 million, with a median size of USD 6 million. The largest loan is for USD 1.035 billion, for an office building in Manhattan.

On average, 6 percent of the loans are collateralized by the properties located in a central business district (CBD), and 27 percent of the properties are renovated. The HHI equals 0.05, on average.

4. Results

4.1. Baseline Results

We now turn to our estimation results. We first test whether distance between lenders and borrowers is priced after controlling for observable mortgage and property characteristics. Table 2 presents the OLS estimates of equation (1) using mortgage originations by banks, non-banks, and all types of lenders. X_i represents a vector of control variables, such as loan purpose, MSA, state where the property is located, originator, borrower and year–quarter time fixed effects.

$$\begin{aligned} Spread = &\beta_0 + \beta_1 Ln(1 + Distance_{Originator-Borrower}) + \Sigma\alpha_i Property\ Characteristics + \\ &\Sigma\gamma_i Mortgage\ Characteristics + X_i + \epsilon \end{aligned} \tag{1}$$

[Table 2: Originator-Borrower Distance and Spread]

The results in Table 2 show that the coefficient on *Ln(1+Distance*$_{Originator-Borrower}$*)* is positive and statistically significant for the full sample. When we repeat our analysis for the subsample of banks, Column (3) and (4) show a positive and statistically significant coefficient on *Ln(1+Distance* $_{Originator-Borrower}$*)*, suggesting that the spread increases with distance between bank and borrower. The estimates are also economically significant. Holding other variables constant, a 100 percent increase in distance is on average associated with a 2.5 basis points increase in spread (column (4)). Summary statistics in Table 1 show a median distance of 893 miles, so our model would predict a 17 basis points increase in spread. Thus, for a median loan (USD 6 million), the increase in total interest costs would be USD 10,000.

We find that bank–borrower distance is positively associated with the loan spread. These results are at odds with previous literature showing a negative relationship due to spatial price discrimination. Naturally, such price discrimination, and thus bank hold–up problem, is less likely in the CMBS market, as borrowers are able to raise financing from non–bank lenders. Instead, we attribute our results to marginal cost pricing or adverse selection.

In columns (5) and (6), we do not find any significant effect of geographic distance on loan pricing for the loans originated by non–bank lenders. This indicates that non–bank lenders have different screening techniques and/or different types of borrowers.

Control variables enter with the expected signs. Consistent with the literature that has found lower default risk for commercial mortgages with longer maturities than those with shorter maturities, we find a negative relationship between loan maturity and spread. The spread is also significantly lower for larger loans.

The coefficient on the loan to value ratio also has the expected positive sign, and when we replace the loan to value ratio with the debt service coverage ratio (column(2), (4) and (6)), we find that the results are robust for including DSCR as a control variable. Unsurprisingly, the DSCR variable is statistically significant and negative, indicating that a higher DSCR reduces the spread.

For banks and all types of lenders, the property type coefficients are in line with expectations in the sense that loans for the riskier property types have higher spreads, and that loans financing apartments, the omitted category in the regression, have the lowest spreads, also in line with their lower risk. For non–bank originators, only the categories hotel and other type are positively related to spread. Building height and a central business district (CBD) location do not seem to play a role in CMBS loan spreads.

4.2. The Effect of Property Type

Next, we employ property type interactions in a similar fashion to An et al. (2011). Mortgage loans collateralized by apartments are much more homogeneous, and therefore easier to judge, than hotel, retail, office and industrial loans, suggesting that the effect of distance should be stronger for the latter property types. To explore this hypothesis, we include interaction terms between main property types and $Ln(1 + Distance_{Originator-Borrower})$. In our estimation, the baseline is apartments (as in Titman et al. (2005)). Table 3 presents the results. The estimated coefficients of the interaction terms are positive and statistically significant for industrial, office, and retail properties for banks, but not for non–banks. In particular, we find that the effect of originator–borrower distance on spread is more pronounced for mortgages collateralized with riskier property types, since the interaction terms are highest for industrial and hotel properties. This effect is also economically significant. For example, the additional interest cost for a median loan is USD 22,000 for industrial properties relative to apartments.

[Table 3: The Effect of Property Type]

4.3. Borrower–Property Distance and Spread

We also consider the distance between borrower and property as an indirect measure of information asymmetry, and we also expect that increasing distance is associated with higher spreads here. Garmaise and Moskowitz (2004) argue that buyers located closer to a property likely have a better understanding of local market conditions and can more easily and cheaply evaluate the property. Ling et al. (2018) show that distant buyers tend to overpay in the commercial property market. Eichholtz et al. (2016) find that office properties owned by distant investors have lower occupancy. If originators are aware of this, they will prefer borrowers that are close to their assets, which may be reflected in loan pricing.

In order to differentiate borrower distance to the originator, we create an indicator variable, D, which is equal to one if Ln(1+Distance$_{Originator-Borrower}$) is smaller than Ln(1+Distance$_{Originator-Property}$). We also define Minimum$_{Distance}$ = {Ln(1+Distance $_{Originator-Borrower}$), Ln(1+Distance$_{Originator-Property}$)}.

$$\begin{aligned} Spread = &\beta_0 + \beta_1 Minimum_{Distance} * D + \beta_2 Ln(1 + Distance_{Borrower-Property}) * D + \\ &\Sigma\alpha_i Property\ Characteristics + \Sigma\gamma_i Mortgage\ Characteristics + X_i + \epsilon \end{aligned} \tag{2}$$

We report the results in Table 4. The coefficient on Ln(1+Distance$_{Originator-Borrower}$), when borrower is closer to originator relative to property, is positive and statistically significant at the 5% level for banks, but not for non–bank lenders. That is, spread increases with distance between originator and borrower. However, the economic effect is relatively small in comparison to our baseline results and is USD 5400 for a median loan.

In column (3) and column (4), we also find a weakly significant and positive effect for borrower–property distance if the property is located closer to the originator relative to the borrower (D=0). Conversely, we find a significant and negative effect for borrower–property distance if the borrower is located closer to the originator relative to the property (D=1).

One possible explanation for these contradictory results is that the borrower–property distance does not matter for our borrowers given their expertise and industry focus. Our findings are therefore more in line with Conklin et al. (2018) who argue that information asymmetries are likely to be relatively small for REITs when investing at a distance, and contradict the informational argument in Garmaise and Moskowitz (2004).

[Table 4: Borrower-Property Distance and Spread]

4.4. *The Effect of Loan Size*

Thus far, we find that loan spreads increase with originator–borrower distance. In this section, we analyze the impact of loan size on originator–borrower distance and loan pricing. Previous literature (e.g.Wittenberg-Moerman (2008)) argues that loan size is typically positively correlated with borrower size. The effect of distance might be more pronounced for small–size loans because small borrowers are more subject to asymmetric information problems. In contrast, large borrowers are usually more transparent. Moreover, a larger loan could enjoy a lower spread due to economies of scale in underwriting. To investigate these predictions, we split our sample into three groups based on the loan size and create two indicator variables: (i) *Small Loans*, which takes a value of one for loans in the lower tercile, and zero otherwise, and (ii) *Large Loans*, which takes a value of one for loans in the top tercile and zero otherwise.

Table 5 presents the results. As before, the coefficient on $Ln(1{+}Distance_{Originator-Borrower})$ is positive and statistically significant for banks, but not for non–banks lenders, meaning that loan spread is increasing with bank–borrower distance. In all columns, in addition to the $Ln(1{+}Distance_{Originator-Borrower})$*Small Loans* interaction we also include the interaction of $Ln(1{+}Distance_{Originator-Borrower})$*Large Loans*. Thus, the coefficient on the interaction term should be interpreted as the marginal effect of loan size as compared with loans in the middle group.

In column (3) and (4) of Table 5, the coefficient on *Ln(1+Distance*$_{Originator-Borrower}$*)*Small Loans* is not significant, but the coefficient on *Ln(1+Distance*$_{Originator-Borrower}$*)*Large Loans* is negative and statistically significant at the 5% level. This suggests that the effect of bank–borrower distance on spread is less pronounced for larger loans relative to the middle group, and that this holds true for both lender groups.

[Table 5: The Effect of Loan Size]

4.5. Default Analysis

Our analysis consistently shows that loan spread increases with bank–borrower distance. A logical question is whether this effect is due to the information cost (adverse selection hypothesis) or transportation cost (screening hypothesis/marginal cost pricing). It is very difficult to make this distinction in the absence of a natural experiment, but we can use auxiliary data on loan performance based on the assumption that loan performance is positively correlated with borrower creditworthiness.

Unfortunately, we do not have data on mortgage histories up until their maturities in our dataset. However, we have information about the status of a total of 1,097 mortgages that are defined as "Resolved", "Restructured/Extension", and "Troubled". Given our limited data, we classify them all as defaulted mortgages. The 1,097 mortgages that we label as defaulted represent 4.1 percent of our total sample.

Because some loans in the sample had not reached maturity at the time of observation, we estimate the Cox proportional hazard (CPH) model, to account for a possible right-censoring problem, which is a standard tool in the CMBS literature for default analysis. We test whether distant borrowers are more likely to default. If all the information associated with borrower risk is captured by hard information, we would not expect the coefficient of the distance variable to be significant.

[Table 6: Hazard Model]

Table 6 presents the result. The estimates are expressed in terms of hazard ratios. A hazard ratio of less than one indicates a decrease in the probability of default, whereas a hazard ratio greater than one indicates an increase in the probability of default. In column

(2), we report the estimates for our bank sample, where we measure bank-borrower distance using lender headquarters. Hazard ratio is not statistically significant.

In column (3), we replace bank headquarter–borrower distance with bank branch–borrower distance. The estimate for bank branch–borrower distance is greater than one and statistically significant at %1 level, which suggests that greater bank branch–borrower distance predicts a greater probability of default. Controlling for spread, the estimate is statistically significant, which suggests that all the information relating to mortgage risk is not captured by hard information at the time of origination.

In column (4), we report the estimates for our non–bank sample. Greater distance predicts a greater probability of default. Overall, our findings indicate that distance between the originatior and the borrower predicts default and increases default probability for both banks and non–banks. However, our analysis in the previous sections shows that only banks incorporate distance into their loan pricing. This indicates that non–bank lenders conduct riskier lending in the CMBS markets.

5. Robustness Tests

In this section, we perform several robustness tests.

5.1. Bank Branch-Borrower Distance

Throughout our analysis, we focus on the locations of banks' headquarters. However, it is likely that local bank branches also engage in the administrative and screening process of the loan application. Therefore, in this section, we repeat our baseline regression with bank branch–borrower distance instead of distance relative to headquarters.

We obtain bank branch data from the SNL Financial LC. We discard observations if a branch was not open when the loan was issued, and subsequently calculate the borrower's distance to the nearest branch. The results are presented in Table 7. The coefficient remains positive and statistically significant at the 1% level for most specifications after controlling for observable property and mortgage characteristics. The magnitude of the coefficient on distance is comparable to that which we reported in column (3) and (4) of Table 2, but is slightly smaller, which makes sense given the smaller average distance between borrowers and branches relative to headquarters. So, we can conclude that our key distance result is robust to this alternative specification of bank location.

[Table 7: Bank Branch-Borrower Distance]

5.2. *Do Out-of-State Borrowers Pay More?*

Next, we investigate whether our results are robust to the inclusion of an additional measure of distance: distance in jurisdicton rather than in miles.

Existing studies show that out–of–state investors pay economically meaningful premiums relative to their in–state counterparts. This premium is found both for apartment complexes (Lambson et al. (2004)), office buildings (Ling et al. (2018)) and commercial real estate markets in general (Agarwal et al. (2018)). The likely reason is that local investors have informational advantages relative to their out–of–state counterparts. For local investors, it is easier and cheaper to obtain local soft information by inspecting buildings and locations, reading local newspapers, and interacting with residents and other building users. Thus, they have superior information relative to non–local investors (Agarwal et al. (2018)).

To test whether the previously found effect of distance on spread is due to the out–of–state effect, we define an indicator variable. "Out–of–State Borrower" that is equal to one if borrower and property are not located in the same state, and zero otherwise. Moreover, following (Agarwal et al. (2018)), we only include loan transactions in which the borrower appears for the first time in the host state.[6] That is, if the borrower has more than one loan in a host state, we only include the first loan.

[Table 8: Out-of-State Borrower]

We present the estimated results in Table 8. In columns (1), (3) and (5), we run the regressions for "first–time borrowers", and find that controlling for the "out–of–state" effect does not meaningfully affect the coefficients on $Ln(1 + Distance_{Originator-Borrower})$. In columns (2), (4), and (6) we run the regressions for the loans originated by all types of lenders, banks and non-banks, respectively, and find similar effects to before. Across all the columns of Table 8, "Out–of–State Borrower" remains insignificant.

[6] Of course, we can only assess this as far as our dataset goes, and it may be possible that a borrower has been active in a city without appearing in our dataset. So this variable is estimated with some error.

5.3. The Effect of the 2008 Financial Crisis

To rule out the possibility that our findings are mainly due to the 2008 financial crisis, we construct an indicator variable, *Post–crisis*, which is equal to one for the years after 2009, and interact it with $Ln(1 + Distance_{Originator-Borrower})$. Specifically, we estimate the model in equation (3):

$$\begin{aligned} Spread = &\beta_0 + \beta_1 Ln(1 + Distance_{Originator-Borrower}) + \beta_2 Post\text{-}crisis + \\ &\beta_3 Ln(1 + Distance_{Originator-Borrower}) * Post\text{-}crisis + \\ &\Sigma\alpha_i Property\ Characteristics + \Sigma\gamma_i Mortgage\ Characteristics + X_i + \epsilon \end{aligned} \tag{3}$$

[Table 9: The Effect of the 2008 Financial Crisis]

Table 9 presents the regression results. The estimate on *Post–crisis* is positive for both lender types, but only statistically significant for banks. This suggests that spreads have gotten higher since the 2008 financial crisis for bank originators, but that non–bank originators have adjusted their pricing behavior less than banks. The interaction term between *Post–crisis* and $Ln(1 + Distance_{Originator-Borrower})$ is statistically insignificant across all the columns of Table 9.

6. Conclusion

In this paper, we show that the loan spread increases with bank–borrower distance in the CMBS market. This effect is more pronounced for the risky property types and less pronounced for large–size loans. On the other hand, we do not find any significant effect from geographical distance on the spread of loans originated by non–bank lenders.

In contrast to the findings in previous literature on spatial price discrimination, we find a positive relation between distance and the loan spread. We argue that CMBS borrowers are less subject to price discrimination and rent extraction by banks due to the nature of CMBS lending and the location of the competitors. Instead, we propose alternative explanations for the effects of geographic distance on the loan spread, based on screening cost and adverse selection risk.

One question naturally arises: Why do banks allocate loans to long–distance borrowers in the first place? First, given the strong competition and new entrants in the CMBS market, conduit lenders must expand their reach, or gradually lose market share. Moreover, while portfolio lenders are more comfortable making loans to borrowers that are nearby, conduit lenders can make loans for a borrower who is buying a property in a different state. Second, as default rates and timing vary across regions, lenders could wish to seek geographical diversification in their loan portfolios.

The evidence presented here shows that despite technological transformations in the banking industry, geographical distance remains a significant factor for loan pricing. These results are consistent with the conceptual arguments of Knyazeva and Knyazeva (2012), who show that the role of distance has not been eliminated by the advancement of information technology in the syndicated loan market.

We do not find any effect of geographical distance for non–bank lenders, but spreads on non–bank loans are on average significantly higher than spreads on bank loans. Additionally, our default analysis shows that distance matters for loans originated by both banks and non–bank lenders but only banks price distance. This suggests that non–bank borrowers are riskier. The difference in loan pricing between originator types even after controlling for key mortgage and property characteristics is consistent with bank and non–bank lenders having different incentives, lending technologies, and/or different types of borrowers.

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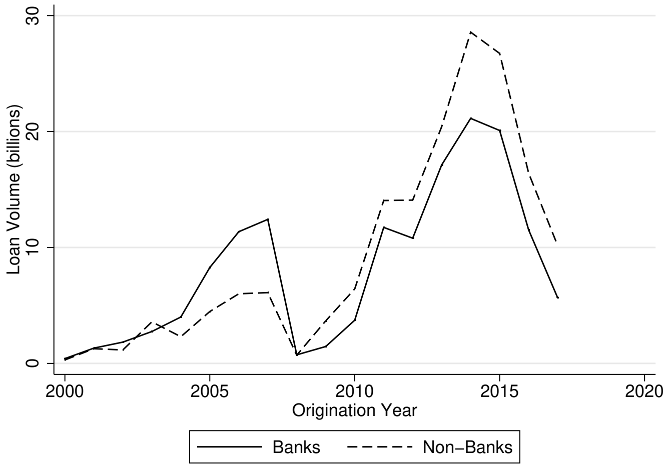

Figure 1: Distribution of loan volumes originated by years.

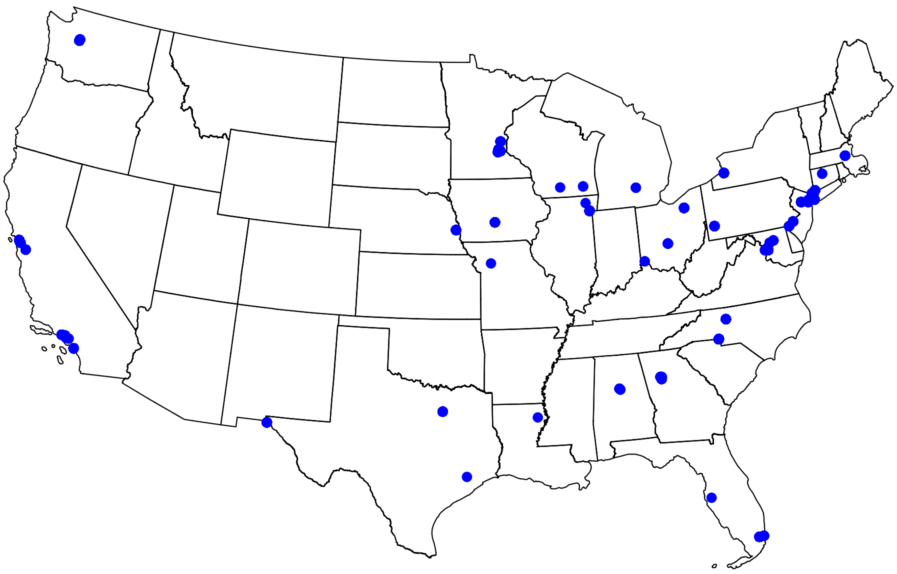

Figure 2: Distribution of lender headquarters

The map shows the location of the 100 lender headquarters we observe in our sample between 2000:Q1 and 2017:Q3. Alaska and Hawaii are not shown.

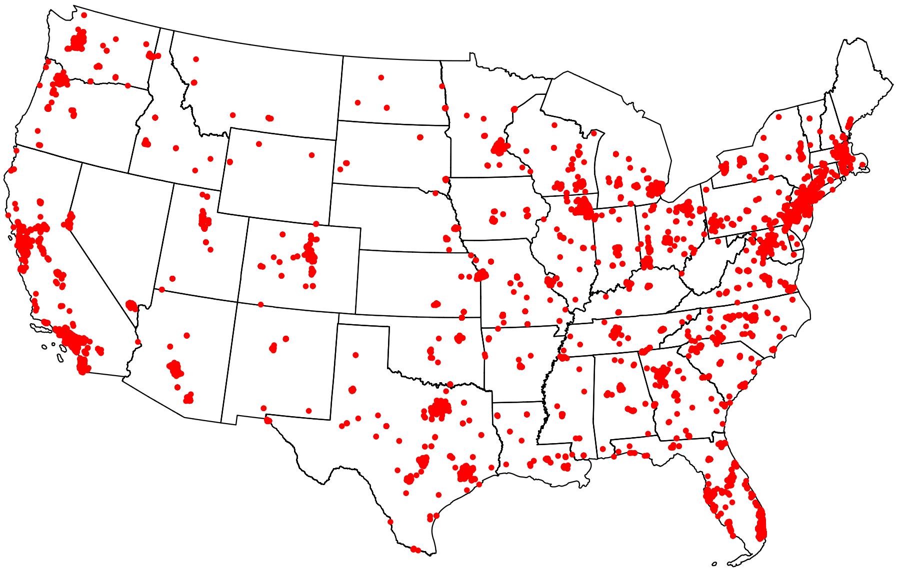

Figure 3: Distribution of borrowers

The map shows the location of the 8,510 unique borrowers we observe in our sample between 2000:Q1 and 2017:Q3. Alaska and Hawaii are not shown.

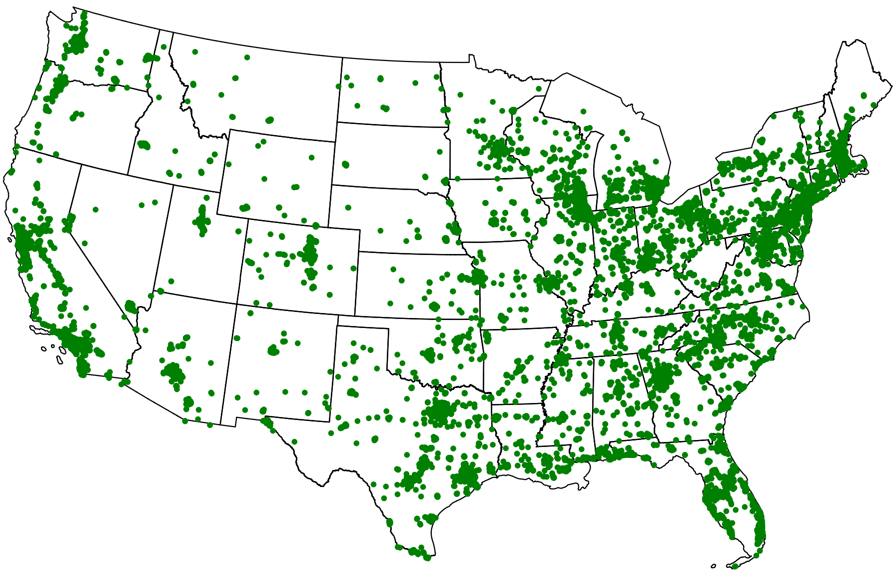

Figure 4: Distribution of properties

The map shows the location of the 24,812 unique properties we observe in our bank subsample between 2000:Q1 and 2017:Q3. Alaska and Hawaii are not shown.

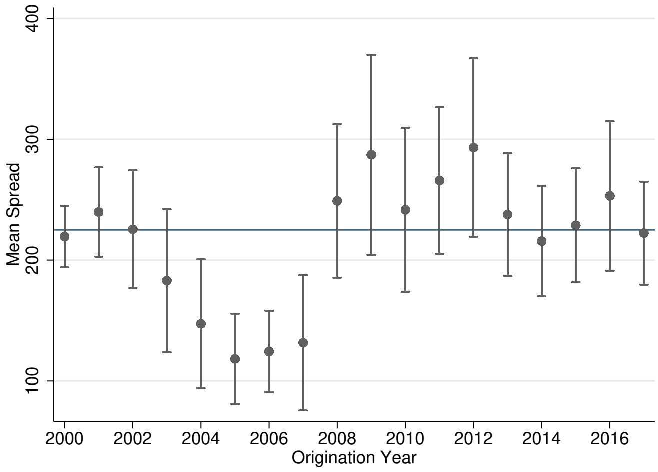

Figure 5: Spread by years

The diagram shows the average loan spread over time, plus and minus one standard deviation. For each year, the dot depicts the mean spread, and the bar shows the plus and minus one standard deviation range. Blue line shows the average spread, 225 bps, for the whole sample period.

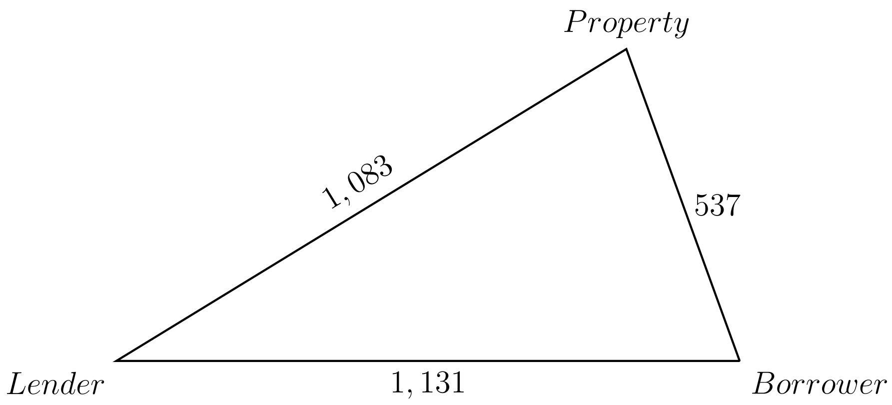

Figure 6: Lender-Borrower-Property mean distances, in miles.

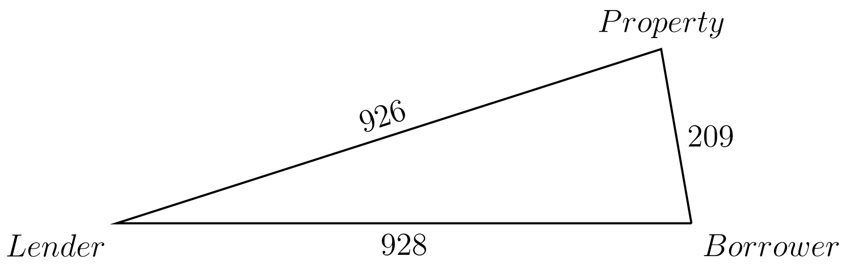

Figure 7: Lender-Borrower-Property median distances, in miles.

Table 1: Summary Statistics

Notes: This table reports summary statistics by loan. Number of observation is 11,458 for loans originated by banks, and 14,845 for loans originated by non-banks. Sample period 2000:Q1–2017:Q3. All variables are defined in the Appendix.

	Full Sample			Bank			Non-Bank		
Variable	**Mean**	**Median**	**SD**	**Mean**	**Median**	**SD**	**Mean**	**Median**	**SD**
Dependent Variable									
Spread (bps)	224.95	225	69.75	215.99	218.5	69.48	231.87	230	69.18
Geographical Distance									
Distance$_{Originator-Borrower}$ (miles)	1,131.55	928.52	887.85	1,145.36	893.83	897.14	1,120.89	949.24	880.49
Distance$_{Originator-Property}$ (miles)	1,083.11	926.67	779.85	1,091.43	866.59	817.88	1,076.68	953.75	749.14
Distance$_{Borrower-Property}$ (miles)	537.10	209.96	674.65	569.79	257.61	692.03	511.87	175.85	659.85
Distance$_{Branch-Borrower}$ (miles)				244.22	2.99	442.10			
Mortgage Characteristics									
Loan to Value Ratio (LTV)	0.65	0.68	0.12	0.64	0.68	0.13	0.65	0.68	0.12
Debt Service Coverage Ratio (DSCR)	1.74	1.56	0.98	1.82	1.58	1.35	1.68	1.55	0.54
Maturity (months)	118.01	120	34.55	116.95	120	33.74	118.83	120	35.14
Loan Size ($million)	11.89	6.00	22.75	12.77	6.29	24.25	11.21	5.80	21.49
Property Characteristics									
Age of the Property									
11-20 years	0.19		0.39	0.20		0.40	0.18		0.38
21-30 years	0.16		0.37	0.16		0.37	0.16		0.37
31-40 years	0.14		0.35	0.13		0.34	0.15		0.36
41-50 years	0.13		0.33	0.11		0.31	0.14		0.35
Over 50 years	0.11		0.31	0.09		0.29	0.12		0.33
Central Business District	0.06		0.25	0.07		0.25	0.06		0.24
Renovated	0.27		0.44	0.26		0.44	0.27		0.44
Number of Stories >1	0.35		0.47	0.31		0.46	0.39		0.48
Other Variables									
Out-of-State Borrower	0.53		0.49	0.56		0.49	0.52		0.49
Post-crisis	0.80		0.39	0.74		0.43	0.84		0.35
Herfindahl-Hirschman Index	0.05	0.02	0.10	0.05	0.02	0.09	0.05	0.02	0.10

Table 2: Originator–Borrower Distance and Spread

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and the Treasury bond rate with the same maturity, in basis points. $Distance_{Originator-Borrower}$ is the geographic distance between originator headquarter and borrower, in miles. Control variables include indicator variables for age of the property, loan purpose, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Bank	Bank	Non-Bank	Non-Bank
Ln(1+$Distance_{Originator-Borrower}$)	1.705***	1.397***	2.648***	2.542***	1.074	1.257
	(0.562)	(0.529)	(0.656)	(0.666)	(0.959)	(0.891)
Ln(1+Maturity)	-55.478***	-61.900***	-49.335***	-51.463***	-69.755***	-74.625***
	(3.306)	(3.630)	(5.721)	(6.278)	(4.186)	(4.629)
Ln(Loan Size)	-5.034***	-4.990***	-4.492***	-4.573***	-4.680***	-4.582***
	(0.530)	(0.561)	(0.758)	(0.743)	(0.728)	(0.732)
Loan to Value Ratio	41.445***		19.612**		31.521***	
	(6.211)		(9.723)		(8.149)	
Debt Service Coverage Ratio		-17.526***		-12.438***		-19.284***
		(2.412)		(3.859)		(2.457)
Ln(Herfindahl–Hirschman Index)	0.713	0.252	4.199**	3.532*	-2.645	-2.292
	(1.494)	(1.395)	(1.976)	(1.931)	(2.329)	(2.168)
Number of Stories >1	0.394	0.732	1.613	1.295	-0.658	-0.481
	(1.109)	(1.167)	(1.691)	(1.686)	(1.252)	(1.289)
Central Business District	0.545	-0.423	-4.100	-3.775	2.484	1.783
	(2.235)	(2.392)	(3.132)	(2.963)	(3.276)	(3.312)
Renovated	1.052	0.820	-0.616	-0.597	-0.022	-0.130
	(0.970)	(0.927)	(1.219)	(1.166)	(1.269)	(1.223)
Hotel	45.016***	53.051***	44.743***	50.732***	35.996***	39.012***
	(5.343)	(5.916)	(10.095)	(11.075)	(9.651)	(8.422)
Industrial	18.375***	14.910***	15.056**	14.577**	-1.569	0.589
	(3.701)	(3.948)	(6.800)	(6.595)	(5.252)	(5.223)
Office	13.992***	14.709***	11.552**	12.982***	5.449	6.627
	(3.048)	(3.149)	(4.488)	(4.076)	(5.349)	(5.125)
Other	14.438***	15.359***	13.787***	14.426***	11.993**	12.508**
	(3.628)	(3.204)	(4.178)	(4.006)	(5.965)	(5.818)
Retail	15.878***	15.029***	23.523***	24.850***	-0.636	0.888
	(2.372)	(2.454)	(4.950)	(5.228)	(4.686)	(4.402)
Constant	463.889***	583.305***	435.580***	493.677***	441.359***	565.152***
	(26.610)	(30.531)	(34.055)	(51.283)	(42.964)	(50.655)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,508	25,098	10,999	10,736	14,509	14,362
Adjusted R^2	0.821	0.828	0.854	0.859	0.847	0.851

Table 3: The Effect of Property Type

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and the Treasury bond rate with the same maturity, in basis points. $Distance_{Originator-Borrower}$ is the geographic distance between originator headquarter and borrower, in miles. Control variables include indicator variables for age of the property, loan purpose, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Bank	Bank	Non-Bank	Non-Bank
Ln(1+$Distance_{Originator-Borrower}$)	-0.675	-0.591	-0.919	-1.068	0.338	0.600
	(0.694)	(0.649)	(1.536)	(1.487)	(1.192)	(1.085)
Hotel	12.838	30.318***	42.415	46.970*	13.119	17.756
	(10.883)	(11.206)	(26.107)	(26.982)	(17.393)	(14.276)
Industrial	-18.907**	-15.412*	-24.156	-25.899	-21.306*	-17.118
	(8.332)	(9.176)	(15.742)	(17.881)	(11.660)	(10.962)
Office	-6.136	-4.339	-26.094**	-25.173**	-4.570	-2.747
	(5.756)	(6.111)	(11.526)	(11.415)	(11.692)	(10.898)
Other	10.793	7.972	-26.061	-27.300	5.268	-5.024
	(12.783)	(11.678)	(19.298)	(17.997)	(18.242)	(26.075)
Retail	-6.906	-6.033	-4.849	-4.170	-7.236	-2.136
	(7.619)	(7.141)	(12.469)	(11.735)	(16.881)	(16.194)
Hotel#c.Ln(1+$Distance_{Originator-Borrower}$)	5.526***	3.720**	0.245	0.485	3.937	3.647
	(1.619)	(1.634)	(3.789)	(3.895)	(2.664)	(2.410)
Industrial#c.Ln(1+$Distance_{Originator-Borrower}$)	6.167***	5.047***	6.496**	6.749**	3.435*	3.098*
	(1.295)	(1.405)	(2.639)	(2.982)	(1.967)	(1.769)
Office#c.Ln(1+$Distance_{Originator-Borrower}$)	3.125***	2.999***	6.000***	6.094***	1.608	1.534
	(1.061)	(1.105)	(1.629)	(1.669)	(1.854)	(1.696)
Other#c.Ln(1+$Distance_{Originator-Borrower}$)	0.649	1.240	5.982**	6.245**	1.105	2.783
	(1.902)	(1.780)	(2.687)	(2.501)	(2.746)	(3.925)
Retail#c.Ln(1+$Distance_{Originator-Borrower}$)	3.592***	3.337***	4.456**	4.579**	1.150	0.607
	(1.164)	(1.094)	(1.887)	(1.819)	(2.384)	(2.312)
Ln(1+Maturity)	-55.599***	-61.918***	-49.771***	-51.963***	-69.734***	-74.686***
	(3.285)	(3.622)	(5.825)	(6.421)	(4.191)	(4.661)
Ln(Loan Size)	-5.082***	-4.997***	-4.410***	-4.454***	-4.704***	-4.598***
	(0.510)	(0.546)	(0.751)	(0.734)	(0.734)	(0.733)
Loan to Value Ratio	40.230***		21.391**		31.575***	
	(6.073)		(9.479)		(8.090)	
Debt Service Coverage Ratio		-17.190***		-12.504***		-19.300***
		(2.345)		(3.901)		(2.442)
Ln(Herfindahl–Hirschman Index)	0.484	0.078	3.838*	3.209*	-2.675	-2.312
	(1.482)	(1.381)	(1.975)	(1.926)	(2.338)	(2.183)
Number of Stories >1	0.350	0.711	1.467	1.144	-0.719	-0.538
	(1.086)	(1.142)	(1.636)	(1.609)	(1.260)	(1.303)
Central Business District	-0.037	-0.876	-4.029	-3.798	2.423	1.708
	(2.277)	(2.447)	(3.147)	(2.996)	(3.271)	(3.305)
Renovated	1.056	0.807	-0.746	-0.721	-0.020	-0.138
	(0.942)	(0.903)	(1.190)	(1.121)	(1.273)	(1.222)
Constant	473.775***	586.720***	455.895***	514.266***	444.308***	568.988***
	(26.753)	(30.047)	(35.215)	(53.312)	(43.100)	(51.409)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,508	25,098	10,999	10,736	14,509	14,362
Adjusted R^2	0.822	0.829	0.855	0.860	0.847	0.851

Table 4: Borrower–Property Distance and Spread

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and the Treasury bond rate with the same maturity, in basis points. $Distance_{Borrower-Property}$ is the geographic distance between borrower and property, in miles. The indicator variable D equals to one if Ln(1+Distance$_{Originator-Borrower}$) is smaller than Ln(1+Distance$_{Originator-Property}$), and zero otherwise. Minimum$_{Distance}$ = {Ln(1+Distance$_{Originator-Borrower}$), Ln(1+Distance$_{Originator-Property}$)}. Control variables include indicator variables for age of the property, loan purpose, property type, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Bank	Bank	Non-Bank	Non-Bank
Ln(1+Distance$_{Originator-Property}$), when property is closer to originator than borrower is	0.723	0.594	0.555	0.517	1.169	1.323*
	(0.547)	(0.472)	(0.749)	(0.710)	(0.806)	(0.768)
Ln(1+Distance$_{Originator-Borrower}$), when borrower is closer to originator than property is	1.031*	0.850*	1.728**	1.606**	1.026	1.264*
	(0.541)	(0.481)	(0.667)	(0.673)	(0.746)	(0.699)
Ln(1+Distance$_{Borrower-Property}$), when property is closer to originator than borrower is	0.913**	0.787*	1.082*	0.971*	0.622	0.837*
	(0.428)	(0.398)	(0.558)	(0.550)	(0.431)	(0.427)
Ln(1+Distance$_{Borrower-Property}$), when borrower is closer to originator than property is	-0.084	-0.038	-1.033**	-1.008*	0.249	0.327
	(0.357)	(0.347)	(0.512)	(0.533)	(0.486)	(0.451)
Ln(1+Maturity)	-55.330***	-61.780***	-48.992***	-51.124***	-69.665***	-74.556***
	(3.276)	(3.607)	(5.690)	(6.244)	(4.170)	(4.613)
Ln(Loan Size)	-5.019***	-4.978***	-4.522***	-4.594***	-4.657***	-4.563***
	(0.525)	(0.558)	(0.744)	(0.733)	(0.728)	(0.732)
Loan to Value Ratio	41.538***		20.607**		31.324***	
	(6.247)		(9.632)		(8.112)	
Debt Service Coverage Ratio		-17.533***		-12.449***		-19.319***
		(2.424)		(3.866)		(2.462)
Ln(Herfindahl–Hirschman Index)	0.767	0.292	4.237**	3.534*	-2.579	-2.228
	(1.506)	(1.402)	(1.988)	(1.959)	(2.311)	(2.148)
Number of Stories >1	0.397	0.732	1.753	1.420	-0.701	-0.520
	(1.106)	(1.165)	(1.673)	(1.672)	(1.252)	(1.290)
Central Business District	0.740	-0.256	-3.851	-3.528	2.477	1.826
	(2.220)	(2.369)	(3.234)	(3.054)	(3.296)	(3.322)
Renovated	1.026	0.801	-0.684	-0.673	-0.066	-0.174
	(0.969)	(0.924)	(1.250)	(1.203)	(1.256)	(1.211)
Hotel	44.924***	52.970***	44.096***	49.918***	35.986***	39.033***
	(5.360)	(5.910)	(9.945)	(10.933)	(9.631)	(8.378)
Industrial	18.286***	14.853***	15.100**	14.436**	-1.484	0.769
	(3.654)	(3.907)	(6.634)	(6.454)	(5.211)	(5.209)
Office	14.080***	14.805***	11.576**	12.907***	5.610	6.890
	(3.013)	(3.104)	(4.490)	(4.077)	(5.326)	(5.109)
Other	14.391***	15.327***	13.921***	14.525***	11.842**	12.314**
	(3.596)	(3.190)	(4.219)	(4.054)	(5.973)	(5.809)
Retail	15.740***	14.927***	23.428***	24.691***	-0.641	0.886
	(2.356)	(2.439)	(4.929)	(5.212)	(4.722)	(4.465)
Constant	465.751***	585.078***	444.368***	503.693***	438.741***	563.104***
	(26.518)	(31.592)	(34.081)	(51.710)	(42.471)	(51.070)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,508	25,098	10,999	10,736	14,509	14,362
Adjusted R^2	0.821	0.828	0.855	0.859	0.847	0.851

Table 5: Loan Size

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and the Treasury bond rate with the same maturity, in basis points. $\text{Distance}_{Originator-Borrower}$ is the geographic distance between originator headquarter and borrower, in miles. The indicator variable *Small Loans* equals one for the loans in the lower tercile, and zero otherwise. The indicator variable *Large Loans* equals one for the loans in the top tercile, and zero otherwise. Control variables include indicator variables for age of the property, loan purpose, property type, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Bank	Bank	Non-Bank	Non-Bank
$\text{Ln}(1+\text{Distance}_{Originator-Borrower})$	1.779***	1.476***	2.855***	2.746***	1.234	1.417
	(0.574)	(0.547)	(0.663)	(0.674)	(0.972)	(0.895)
Small Loans#c.$\text{Ln}(1+\text{Distance}_{Originator-Borrower})$	0.446***	0.279*	0.180	0.162	0.248	0.135
	(0.170)	(0.151)	(0.260)	(0.260)	(0.212)	(0.208)
Large Loans#c.$\text{Ln}(1+\text{Distance}_{Originator-Borrower})$	-0.453***	-0.361**	-0.568**	-0.559**	-0.466**	-0.442**
	(0.168)	(0.167)	(0.239)	(0.241)	(0.224)	(0.223)
Ln(1+Maturity)	-55.420***	-61.810***	-49.092***	-51.215***	-69.684***	-74.562***
	(3.288)	(3.605)	(5.722)	(6.282)	(4.155)	(4.613)
Ln(Loan Size)	-3.467***	-3.866***	-3.188***	-3.311***	-3.472***	-3.599***
	(0.718)	(0.734)	(1.105)	(1.116)	(0.825)	(0.873)
Loan to Value Ratio	41.205***		20.539**		30.990***	
	(6.221)		(9.601)		(8.296)	
Debt Service Coverage Ratio		-17.463***		-12.473***		-19.249***
		(2.399)		(3.912)		(2.455)
Ln(Herfindahl–Hirschman Index)	0.641	0.205	4.125**	3.448*	-2.668	-2.293
	(1.493)	(1.393)	(1.973)	(1.935)	(2.337)	(2.171)
Number of Stories >1	0.457	0.775	1.653	1.330	-0.593	-0.429
	(1.103)	(1.162)	(1.678)	(1.675)	(1.251)	(1.286)
Central Business District	0.348	-0.527	-3.895	-3.594	2.337	1.699
	(2.245)	(2.393)	(3.124)	(2.945)	(3.291)	(3.320)
Renovated	1.118	0.872	-0.557	-0.537	0.017	-0.094
	(0.963)	(0.923)	(1.212)	(1.155)	(1.267)	(1.221)
Hotel	45.231***	53.108***	44.109***	50.133***	36.112***	39.144***
	(5.287)	(5.902)	(9.982)	(10.981)	(9.648)	(8.420)
Industrial	18.387***	14.909***	15.189**	14.639**	-1.353	0.749
	(3.606)	(3.885)	(6.795)	(6.604)	(5.183)	(5.131)
Office	13.818***	14.569***	11.348**	12.799***	5.463	6.624
	(3.022)	(3.127)	(4.480)	(4.065)	(5.297)	(5.056)
Other	14.157***	15.168***	13.693***	14.342***	11.593*	12.199**
	(3.606)	(3.214)	(4.184)	(4.032)	(5.969)	(5.820)
Retail	15.783***	14.966***	23.404***	24.739***	-0.706	0.823
	(2.363)	(2.436)	(4.922)	(5.189)	(4.689)	(4.397)
Constant	440.622***	565.776***	396.396***	453.437***	421.956***	550.232***
	(26.190)	(29.016)	(31.042)	(48.320)	(41.385)	(49.426)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,508	25,098	10,999	10,736	14,509	14,362
Adjusted R^2	0.821	0.828	0.855	0.859	0.847	0.851

Table 6: Default Analysis

Notes: This table reports the estimation results of Cox-proportional hazard models explaining loan default. The indicator variable *Loan Default* equals one when the mortgage is classified either "resolved","restructured/extension" and "troubled", and zero otherwise. For each variable, we present the hazard ratio. $Distance_{Originator-Borrower}$ is the geographic distance between originator headquarter and borrower, in miles. Control variables include indicator variables for age of the property, loan purpose, property type, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Loan Default			
	(1)	(2)	(3)	(4)
	Full Sample	Bank	Bank-Branch	Non-Bank
Ln(1+$Distance_{Originator-Borrower}$)	1.010	0.965		1.117**
	(0.024)	(0.028)		(0.061)
Ln(1+$Distance_{Branch-Borrower}$)			1.084***	
			(0.027)	
Spread	0.984***	0.986***	0.984***	0.981***
	(0.001)	(0.001)	(0.001)	(0.002)
Ln(1+Maturity)	0.229***	0.324***	0.294***	0.066***
	(0.030)	(0.049)	(0.054)	(0.022)
Ln(Loan Size)	1.007	1.110**	1.083	0.878**
	(0.041)	(0.054)	(0.066)	(0.058)
Loan to Value Ratio >75	3.472***	3.207***	3.379***	4.623***
	(0.545)	(0.490)	(0.626)	(1.359)
Number of Stories >1	0.926	1.074	1.151	0.642*
	(0.116)	(0.135)	(0.172)	(0.165)
Central Business District	0.925	0.883	0.828	1.096
	(0.230)	(0.292)	(0.244)	(0.403)
Renovated	1.200**	1.024	1.047	1.334*
	(0.109)	(0.111)	(0.131)	(0.212)
Observations	25,508	10,999	10,337	14,509

Table 7: Bank Branch–Borrower Distance and Spread

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and Treasury bond rate with the same maturity, in basis points. $Distance_{Branch-Borrower}$ is the geographic distance between nearest bank branch and borrower, in miles. Control variables include indicator variables for age of the property, loan purpose, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread			
	(1)	(2)	(3)	(4)
Ln(1+Distance$_{Branch-Borrower}$)	1.734**	1.274***	1.587***	1.622***
	(0.819)	(0.479)	(0.595)	(0.581)
Ln(1+Maturity)		-53.063***	-52.291***	-53.977***
		(5.788)	(5.755)	(6.326)
Ln(Loan Size)		-4.544***	-4.541***	-4.718***
		(0.773)	(0.746)	(0.726)
Loan to Value Ratio		10.363	14.641	
		(10.144)	(10.124)	
Debt Service Coverage Ratio				-11.714***
				(3.804)
Ln(Herfindahl–Hirschman Index)		5.005**	4.056*	3.511
		(2.184)	(2.148)	(2.169)
Number of Stories >1		1.729	1.976	1.697
		(1.687)	(1.685)	(1.706)
Central Business District		-5.088	-5.938*	-5.716**
		(3.116)	(3.021)	(2.781)
Renovated		0.112	-0.135	-0.154
		(1.411)	(1.342)	(1.316)
Hotel		48.897***	41.699***	48.152***
		(10.329)	(10.216)	(11.229)
Industrial		16.059**	11.743*	11.547*
		(6.586)	(6.699)	(6.769)
Office		17.178***	12.200***	13.962***
		(3.525)	(3.948)	(3.646)
Other		20.482***	15.997***	16.748***
		(4.060)	(4.115)	(3.965)
Retail		28.150***	24.106***	25.433***
		(4.993)	(5.072)	(5.377)
Constant	212.610***	491.921***	490.366***	531.718***
	(2.523)	(31.238)	(30.307)	(32.399)
Control variables	No	Yes	Yes	Yes
Bank FE	No	No	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Year-quarter FE	No	Yes	Yes	Yes
Observations	10,733	10,337	10,337	10,098
Adjusted R^2	0.551	0.854	0.858	0.862

Table 8: Out-of-State Borrowers

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and Treasury bond rate with the same maturity, in basis points. The indicator variable *Out-of-State Borrower* equals one if the borrower and property are located in different states, and zero otherwise. Control variables include indicator variables for age of the property, loan purpose, property type, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample-First	Full Sample	Bank-First	Bank	Non-Bank-First	Non-Bank
Ln(1+Distance$_{Originator-Borrower}$)	2.065**	1.703***	3.513**	2.671***	2.254	1.093
	(0.801)	(0.562)	(1.456)	(0.658)	(1.911)	(0.960)
Out–of–State	-0.402	0.507	-0.983	-2.152	1.833	1.319
	(1.512)	(1.338)	(2.505)	(1.658)	(3.322)	(1.950)
Ln(1+Maturity)	-58.551***	-55.455***	-55.933***	-49.440***	-59.937***	-69.704***
	(5.745)	(3.310)	(8.599)	(5.736)	(10.145)	(4.194)
Ln(Loan Size)	-4.232***	-5.035***	-3.686***	-4.474***	-3.798***	-4.677***
	(0.655)	(0.530)	(0.972)	(0.756)	(1.081)	(0.727)
Loan to Value Ratio	24.132*	41.429***	39.720**	19.556**	6.354	31.502***
	(14.347)	(6.221)	(16.452)	(9.748)	(23.051)	(8.149)
Ln(Herfindahl–Hirschman Index)	3.698	0.709	5.847	4.166**	-1.026	-2.641
	(2.876)	(1.493)	(3.713)	(1.983)	(4.753)	(2.325)
Number of Stories >1	-1.244	0.388	0.218	1.662	-1.902	-0.660
	(1.609)	(1.114)	(2.102)	(1.697)	(2.420)	(1.254)
Central Business District	1.850	0.548	-2.215	-4.087	2.778	2.472
	(3.140)	(2.234)	(3.815)	(3.148)	(4.930)	(3.280)
Renovated	1.268	1.048	0.260	-0.622	1.090	-0.035
	(1.187)	(0.968)	(1.558)	(1.222)	(1.815)	(1.265)
Hotel	46.599***	45.061***	78.155***	44.361***	17.549	35.920***
	(10.469)	(5.332)	(15.088)	(10.010)	(15.021)	(9.609)
Industrial	16.797***	18.383***	25.505**	14.973**	-0.003	-1.560
	(5.723)	(3.701)	(10.725)	(6.809)	(10.913)	(5.260)
Office	21.598***	14.015***	25.300***	11.392**	15.644	5.439
	(5.396)	(3.047)	(8.689)	(4.475)	(11.216)	(5.366)
Other	24.284***	14.401***	24.489***	13.897***	18.650*	11.909**
	(5.864)	(3.627)	(8.688)	(4.212)	(9.433)	(6.015)
Retail	21.146***	15.866***	32.967***	23.476***	4.454	-0.692
	(4.598)	(2.374)	(7.975)	(4.940)	(8.757)	(4.701)
Constant	513.763***	463.494***	392.925***	437.483***	285.227***	439.638***
	(38.132)	(26.549)	(49.196)	(34.248)	(65.747)	(42.804)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,439	25,508	7,326	10,999	9,113	14,509
Adjusted R^2	0.879	0.821	0.915	0.854	0.902	0.847

Table 9: The Effect of the 2008 Financial Crisis

Notes: This table reports OLS regression results. The dependent variable is the loan spread, between the mortgage rate and Treasury bond rate with the same maturity, in basis points. $\text{Distance}_{Originator-Borrower}$ is the geographic distance between originator headquarter and borrower, in miles. The indicator variable *Post-crisis* equals one for the loans originated after the year 2009, and zero otherwise. Control variables include indicator variables for age of the property, loan purpose, property type, MSA, and state where the property is located. All variables are defined in the Appendix. Robust standard errors, clustered at the MSA level, are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Bank	Bank	Non-Bank	Non-Bank
Ln(1+$\text{Distance}_{Originator-Borrower}$)	1.777	2.044	3.332**	3.747**	-0.292	0.362
	(1.168)	(1.292)	(1.358)	(1.563)	(2.044)	(2.107)
Postcrisis	66.528***	56.047**	76.190***	67.954*	37.642	59.315
	(16.287)	(27.329)	(19.865)	(40.012)	(32.723)	(40.805)
Postcrisis#c.Ln(1+$\text{Distance}_{Originator-Borrower}$)	-0.090	-0.793	-0.907	-1.563	1.673	1.072
	(1.203)	(1.319)	(1.582)	(1.731)	(2.084)	(2.142)
Ln(1+Maturity)	-55.482***	-61.961***	-49.319***	-51.431***	-69.655***	-74.537***
	(3.321)	(3.669)	(5.721)	(6.284)	(4.193)	(4.662)
Ln(Loan Size)	-5.034***	-4.992***	-4.500***	-4.585***	-4.680***	-4.580***
	(0.530)	(0.563)	(0.758)	(0.745)	(0.727)	(0.732)
Loan to Value Ratio	41.455***		19.509**		31.483***	
	(6.171)		(9.721)		(8.175)	
Debt Service Coverage Ratio		-17.545***		-12.445***		-19.270***
		(2.439)		(3.857)		(2.468)
Ln(Herfindahl–Hirschman Index)	0.706	0.187	4.076**	3.311*	-2.579	-2.249
	(1.498)	(1.397)	(1.959)	(1.890)	(2.332)	(2.172)
Number of Stories >1	0.396	0.745	1.613	1.296	-0.656	-0.482
	(1.116)	(1.173)	(1.693)	(1.688)	(1.251)	(1.290)
Central Business District	0.549	-0.398	-4.026	-3.660	2.394	1.734
	(2.237)	(2.407)	(3.093)	(2.914)	(3.289)	(3.325)
Renovated	1.052	0.823	-0.630	-0.598	-0.015	-0.130
	(0.968)	(0.930)	(1.229)	(1.164)	(1.271)	(1.226)
Hotel	44.999***	52.989***	44.828***	50.873***	35.624***	38.766***
	(5.354)	(5.888)	(10.161)	(11.114)	(9.643)	(8.415)
Industrial	18.400***	15.107***	15.082**	14.569**	-1.581	0.525
	(3.749)	(3.970)	(6.810)	(6.596)	(5.275)	(5.257)
Office	14.005***	14.826***	11.662**	13.177***	5.479	6.614
	(3.033)	(3.139)	(4.545)	(4.140)	(5.374)	(5.141)
Other	14.459***	15.484***	14.021***	14.818***	12.086**	12.626**
	(3.602)	(3.197)	(4.269)	(4.053)	(5.956)	(5.815)
Retail	15.883***	15.074***	23.461***	24.768***	-0.639	0.852
	(2.375)	(2.457)	(4.899)	(5.174)	(4.705)	(4.421)
Constant	379.803***	579.835***	430.807***	485.470***	451.280***	571.130***
	(26.470)	(30.330)	(36.246)	(54.432)	(42.213)	(50.274)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Originator FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,508	25,098	10,999	10,736	14,509	14,362
Adjusted R^2	0.821	0.828	0.854	0.859	0.847	0.851

Appendices

A. Sample

Table A.1: Distributions of Property Types

Notes: This table reports the number of loans by property types. Sample period: 2000:Q1–2017:Q3.

Numbers of Loans by Property Types		
Property Types	Number of Loans by Banks	Number of Loans by Non–Banks
Apartment	4,156	8,026
Hotel	949	776
Industrial	607	948
Office	1,311	1,178
Retail	2,554	2,393
Other	1,881	1,524
Total	11,458	14,845

B. Variable Definition

Variable	Definition
Geographical Distance	
Ln(1+Distance$_{Originator-Borrower}$)	The natural logarithm of one plus the distance between bank headquarter and borrower. Distance$_{Originator-Borrower}$ is calculated from geographic coordinates, in miles.
Ln(1+Distance$_{Branch-Borrower}$)	The natural logarithm of one plus the distance between closest bank branch and borrower. Distance$_{Branch-Borrower}$ is calculated from geographic coordinates, in miles.
Ln(1+Distance$_{Originator-Property}$)	The natural logarithm of one plus the distance between bank headquarter and property. Distance$_{Originator-Property}$ is calculated from geographic coordinates, in miles.
Ln(1+Distance$_{Borrower-Property}$)	The natural logarithm of one plus the distance between borrower and property. Distance$_{Borrower-Property}$ is calculated from geographic coordinates, in miles.
Mortgage Loan Characteristics	
Debt Service Coverage Ratio	The ratio of the income generated by the property to the debt service required by the loan.
Loan to Value Ratio	The ratio of the loan to the value of the property.
Ln(1+Maturity)	The natural logarithm of maturity, in months.
Ln(Loan Size)	The natural logarithm of loan amount, in millions.
Large Loans	An indicator variable that equals to one for loans in the top tercile of loan size, zero otherwise.
Small Loans	An indicator variable that equals to one for loans in the lower tercile of loan size, zero otherwise.
Spread	The difference between mortgage rates and Treasury bond rates with the same maturities, in basis points.
Property Characteristics	
Age of the Property	Indicator variables identifying the age group of the property. Age groups include less than 10, 10-20, 20-30, 30-40, 40-50, and more than 50.
Central Business District	An indicator variable that equals to one if the property is located in a central business district (CBD), zero otherwise.
Number of Stories>1	An indicator variable that equals to one if the number of stories is greater than one, zero otherwise.

Variables	Description
Property Type	
Apartment	An indicator variable that equals to one if the property type is apartment, zero otherwise.
Hotel	An indicator variable that equals to one if the property type is hotel, zero otherwise.
Industrial	An indicator variable that equals to one if the property type is industrial, zero otherwise.
Office	An indicator variable that equals to one if the property type is office, zero otherwise.
Retail	An indicator variable that equals to one if the property type is retail, zero otherwise.
Other	An indicator variable that equals to one for another type of property, zero otherwise.
Renovated	An indicator variable and equals to one for the properties renovated, zero otherwise.
Other Variables	
Ln(Herfindahl-Hirschman Index)	The natural logarithm of the summed squares of bank market shares, in each state.
Post–crisis	An indicator variable that equals to one for the loans originated after the year 2009, zero otherwise.
Out-of-State Borrower	An indicator variable that equals to one if the borrower and property are located in different states, zero otherwise.
Loan Purpose	
Property Acquisition	An indicator variable that equals to one if the loan purpose is property acquisition, zero otherwise.
Refinance	An indicator variable that equals to one if the loan purpose is refinance, zero otherwise.
Metropolitan Statistical Area FE	Indicator variables identifying the metropolitan statistical area (MSA) where the property is located.
State FE	Indicator variables identifying the state where the property is located.
Year-quarter FE	Indicator variables identifying the origination year-quarter of the loan.

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